BANK OF CANADA
BANQUE DU CANADA

Discussion Paper/Document d'analyse
2012-2

# Why Is Cash (Still) So Entrenched? Insights from the Bank of Canada's 2009 Methods-of-Payment Survey

by Carlos Arango, Dylan Hogg and Alyssa Lee

www.bank-banque-canada.ca

Bank of Canada Discussion Paper 2012-2

February 2012

# Why Is Cash (Still) So Entrenched? Insights from the Bank of Canada's 2009 Methods-of-Payment Survey

by

**Carlos Arango, Dylan Hogg and Alyssa Lee**

Currency Department
Bank of Canada
Ottawa, Ontario, Canada K1A 0G9
carango@bankofcanada.ca
dhogg@bankofcanada.ca
alyssalee@bankofcanada.ca

Bank of Canada discussion papers are completed research studies on a wide variety of technical subjects relevant to central bank policy. The views expressed in this paper are those of the authors. No responsibility for them should be attributed to the Bank of Canada.

ISSN 1914-0568

© 2012 Bank of Canada

# Acknowledgements

The authors are grateful for the helpful comments and suggestions provided by Ben Fung, Lorraine Charbonneau, Kim Huynh and Gerald Stuber. We also thank participants at the International Association of Currency Affairs' second and third Central Bank Forum on Payment Surveys, at the Oesterreichische Nationalbank workshop on Consumer Payment Choice and the Demand for Money (2010), and at the Canadian Payments Association annual conference (2010). The authors would also like to thank Angelika Welte and Leonard Sabetti for their valuable research assistance.

## Abstract

The authors present key insights from the Bank of Canada's 2009 Methods-of-Payment survey. In the survey, about 6,800 participants completed a questionnaire with detailed information regarding their personal finances, as well as their use and perceptions of different payment methods. In addition, about 3,500 participants completed a 3-day diary recording information on each transaction, including the value and the payment instrument chosen. One of the main findings from the diaries is that, even though debit and credit cards account for close to 80 per cent of all transactions in terms of total value, cash is still the predominant payment method in terms of volume, accounting for 54 per cent of all transactions. Using the payment records from the diaries, the authors estimate a simple model of choice between cash and other payment methods. The results suggest that the main reasons why cash is still a popular payment instrument in Canada, especially for small-value transactions, are its wide acceptance among merchants, high ease of use or speed, low handling costs, simplicity as a tool to control spending, and anonymity.



*JEL classification: E41, D12, L81*
*Bank classification: Bank notes; Financial services*



## Résumé

Les auteurs présentent les points clés de l'enquête sur les modes de paiement menée par la Banque du Canada en 2009. Environ 6 800 participants ont alors répondu à un questionnaire détaillé sur leurs finances personnelles ainsi que sur leur usage et leurs perceptions de diverses méthodes de paiement. En outre, quelque 3 500 participants ont tenu un journal où ils ont consigné pendant trois jours des renseignements sur chacun de leurs achats, notamment sa valeur et l'instrument de paiement employé. L'analyse de ces journaux fait ressortir que même si les règlements par cartes de débit et de crédit représentent près de 80 % des transactions en valeur, l'argent comptant domine toujours pour ce qui est du volume, puisque 54 % des transactions sont réglées en espèces. À l'aide des informations contenues dans les journaux d'achats, les auteurs estiment un modèle simple dans lequel les acheteurs ont le choix entre l'argent liquide et d'autres méthodes de paiement. D'après les résultats du modèle, le règlement en argent comptant reste un mode de paiement populaire au Canada, surtout pour les transactions de faible montant, parce qu'il est bien accepté par les commerçants, qu'il est commode, rapide, peu coûteux et anonyme et qu'il facilite la gestion d'un budget.



*Classification JEL : E41, D12, L81*
*Classification de la Banque : Billets de banque; Services financiers*

# 1. Introduction

The payments landscape in Canada has changed markedly over the past two decades. Cash was the most important instrument for retail payment in the first half of the 1990s (Chart 1). However, the way Canadians pay has changed since then, and cash now accounts for only a fifth of total payments in terms of value. The decline in the use of cash can be attributed to a number of factors. First, the introduction of debit card payments at the point of sale (POS) during the 1990s provided consumers with a safe and convenient substitute for cash. As a result, the number of debit card transactions experienced rapid growth well into the early 2000s. During the past decade, the share of credit cards has grown strongly as more merchants have begun to accept them and more consumers make use of credit cards with increasingly generous rewards programs.

New innovations are part of the changing payments landscape and many of them possess features that could further reduce cash usage. Examples include the increased ease of use or speed at the checkout with stored-value cards or contactless[1] card payments; the enabling of debit and credit payments through mobile phones[2] for both POS and person-to-person transactions; and the growth of e-commerce, where paper-based payment methods such as cash may become increasingly irrelevant.

These developments are of particular interest to the Bank of Canada. As the sole issuer of Canadian bank notes, the Bank seeks to understand how cash is used, how efficient it is relative to alternative methods of payment (MOP) and the likely evolution of cash usage in the future. Answering these questions is vital for the Bank's long-term planning and, more broadly, for payments system policy. New developments in the retail payment system raise important issues related to efficiency, safety, financial soundness and competition. To better understand these issues, the Bank has commissioned a number of surveys to gather information about key players in retail payments, such as consumers and merchants.[3] The latest effort is the 2009 MOP survey, which includes a shopping diary where consumers record their purchases and payment instruments used over a 3-day period. One of the main findings from the survey is that cash is still the predominant payment instrument in terms of volume, accounting for 53.8 per cent of all transactions recorded in the diaries.

This paper uses the 2009 MOP survey data to study the main factors underlying the high frequency of cash usage for day-to-day payments. More specifically, we estimate a discrete-choice model of cash versus other payment methods. The results suggest that cash is still

---

[1] Contactless refers to a feature that can be found on some debit and credit cards, where a consumer simply waves or taps the card over a terminal to pay for a purchase without the need to swipe, enter a PIN or sign anything.

[2] Payment through a mobile phone is often linked ultimately to a person's credit card or bank account.

[3] See Taylor (2006) and Arango and Taylor (2008–09, 2009a).

frequently used in Canada because of the following factors:

1. Cards are perceived by consumers as not being widely accepted. Indeed, where cash, debit and credit are *all* accepted, consumers are 30 per cent less likely to use cash. Cash use is especially high for transactions below $25, where perceived card acceptance is substantially lower.
2. Cash has several characteristics that make it more appealing to consumers than other payment methods. In particular, consumers prefer to use cash because they find it fast, cheap, safe against fraud and convenient for budget-control purposes. Ease of use or speed, in particular, accounts for at least a third of the share of cash payments for transactions below $25.

However, consumers are quite sensitive to cash withdrawal costs. We show that the more cash individuals hold at the beginning of the 3-day shopping period, all things equal, the more likely they are to use cash. Yet, the higher the value of the transaction relative to the initial cash holdings, the more likely it is that people will hold on to their cash. Clearly, consumers dislike the possibility of running out of cash, since they may incur costs in terms of time, effort and fees to get more.

The results suggest that one main reason for paying with cash is because "consumers have to," since they perceive that other payment alternatives are not accepted. However, another reason is that "consumers like to" use cash because they find it convenient and safe.

This paper is organized as follows. In the next section we provide a brief description of the 2009 MOP survey. In section 3 we provide a detailed account of the survey results and stylized facts on consumers' payment instrument use. Section 4 presents a model of cash usage at the point of sale.[4] Section 5 discusses the empirical results. Section 6 concludes.

## 2. The 2009 Methods-of-Payment Survey

In 2004, the Bank of Canada conducted its first consumer payments survey to study the public's perceptions and use of cash and other payment instruments. This phone survey provided valuable information regarding people's cash-handling behaviour and the factors influencing payment demand. Taylor (2006) finds that cash was the most frequently used payment method: 73 per cent of survey respondents indicated using cash at least once a week, followed by debit cards (64 per cent) and credit cards (36 per cent). Using the same survey, Arango and Taylor (2009b) show that differences in perceptions of convenience and risk of cash relative to cards were

[4] In this paper, point of sale is used loosely to mean purchases where there is a buyer and a seller involved but there is not a need for a physical location or particular trading technology to finalize a transaction.

significant determinants of cash use. However, the authors acknowledge that more precise information would be required to determine how and why Canadians use cash the way they do.

The 2009 MOP survey builds on the results obtained from the 2004 public survey. The Bank commissioned Ipsos Reid to conduct the 2009 survey. It focuses on methods of payment used for personal day-to-day purchases of goods and services, excluding bill payments and work-related activities. The sample was drawn from Ipsos Reid access panels (directories of people willing to participate in surveys on a regular basis) using stratified random sampling[5] of 18- to 75-year-old Canadian residents. The 2009 MOP survey's main features are:

1. A survey questionnaire of 52 questions to collect information about individuals' personal finances, socioeconomic characteristics, payment habits, and their perceptions and attitudes toward different payment attributes such as speed, record keeping, privacy, safety and access to credit.[6]
2. A 3-day shopping diary to collect information about the frequency of use of different payment instruments and various transaction characteristics (e.g., transaction values; type of goods and services purchased; type of payment instruments accepted by merchants).[7]

The survey was administered over the course of November 2009, so the diaries represent a month's worth of transactional data.[8] The final data set includes about 6,800 survey questionnaires, 3,500 diaries, and 16,000 transactions.

## 3. Drivers of Cash Usage: Survey Highlights

One of the most salient results from the diaries is that, although credit cards dominate household retail payments in terms of value (accounting for 40.1 per cent), cash is still the predominant payment instrument in terms of volume (i.e., the number of transactions), accounting for 53.8 per cent of all transactions in the diaries (Chart 2). However, Table 1 shows that the prevalence of cash is concentrated in lower-value transactions. In fact, the average cash transaction in the diaries is $16.9, whereas it is $51.3 and $84.4 for the average debit and credit card transactions, respectively.

---

[5] Stratified sampling involves dividing the population into homogeneous, mutually exclusive groups called "strata," and then taking independent samples from each stratum.

[6] Some of the questions in the questionnaire are based on the Survey of Consumer Payment Choice of the Federal Reserve Bank of Boston, which collaborated with the Bank of Canada in the development of the survey instruments (Foster et al. 2010).

[7] Such methodology has been used by a handful of central banks (including those for Austria, the Netherlands, Germany and Australia) as a key tool for estimating the volume and value shares of cash use in their economy and to monitor developments in retail payment usage (Mooslechner, Stix and Wagner 2006; Jonker and Kosse 2009; Hoffmann et al. 2009).

[8] See Arango and Welte (forthcoming) for a detailed discussion of the survey methodology and main results.

Using the survey results, a back-of-the-envelope calculation of the volume of cash payments in the Canadian economy yields 7.7 billion transactions compared with the card networks data of 2.6 billion and 3.9 billion for credit and debit cards, respectively, in 2009.[9] Moreover, 81 per cent of this volume of cash payments, as estimated from the diaries, is for values of less than $25.

We use the rich data from the survey to study why cash is still so entrenched in terms of transaction volumes. To do so, it is useful to think of retail payment systems as two-sided markets: a payment service provider must attract consumers to use the payment instrument and merchants to accept it.[10] Suppliers of payment services therefore require both buyers and sellers to create the demand for their services. Consumers must find some benefit in the use of a payment instrument, while merchants must find it profitable to incur the costs of accepting it. Therefore, to understand why consumers pay the way they do at the point of sale, one has to control for the types of payment instruments available to consumers and their respective benefits and costs in different transactions.

## 3.1 Cash is still frequently used even where debit and credit cards are accepted

One important consideration in the use of a particular payment method is its degree of acceptance by merchants. As Arango and Taylor (2008–09, 2009a) show, cash is indeed cheapest for merchants in terms of variable costs at stores where the average transaction value is below $23. They also show that cash is preferred by those small merchants that tend to process high volumes of low-value transactions. These results are consistent with the 2009 MOP findings regarding payments acceptance. To gauge how restricted consumers feel about their use of different payment instruments, the 2009 MOP survey questionnaire asked about perceptions regarding levels of acceptance for different payment instruments on a scale from 1 (not accepted anywhere) to 5 (accepted everywhere). As Chart 3 shows, 83 per cent of survey respondents perceive that cash is accepted everywhere, whereas only half of the individuals perceive that credit and debit cards are accepted everywhere. Hence, consumers seem to face more uncertainty about merchants' acceptance of cards than of merchants' acceptance of cash.

Furthermore, in the diaries, respondents were asked to report on the payment methods they perceived were accepted at the time of purchase. Table 2 shows the proportion of transactions

[9] We can obtain two estimates of total payment volumes by dividing the debit and credit card volumes reported by the card networks by their shares estimated from the diaries; multiplying the average of these two volume estimates by the cash share yields 7.7 billion cash transactions.

[10] The two-sided market approach to payments has a long tradition in the literature. This approach highlights the issues associated with the coordination of buyers' and sellers' needs and incentives to participate in a payment system. Baxter (1983) and Rochet and Tirole (2002, 2003) set out the theoretical framework that has since been used extensively to study the important issues associated with the pricing of payment services (e.g., interchange fees), payment system participation, and competition and strategic interaction among participants (see Rochet and Tirole 2006 for a review of the two-sided markets approach, and Bolt and Chakravorti 2008 for a review of this approach applied to payments and its implications for government intervention).

where an individual thought cards were accepted, broken down by the dollar value of the transaction and the size of the merchant. We find that perceived card acceptance increases with both merchant size and transaction value.[11]

To gauge the extent to which cash usage could be explained by merchant acceptance, we compare the frequency of cash payments in the diary (all transactions) with the frequency of cash payments when respondents perceive that all payment methods are accepted. Chart 4 shows that the proportion of transactions made with cash is lower when it is perceived that all major payment instruments are accepted.

These results demonstrate that an understanding of cash usage is a complex matter. The fact that consumers are less likely to use cash when they perceive that all payment methods are accepted supports the idea that, in some cases, cash is used because of necessity rather than desire. However, even after acceptance is taken into account, cash is still frequently used for low-value transactions, which means that consumers still value some of the attributes that differentiate cash from cards. For example, roughly 50 per cent of the transactions below $25 are still paid for with cash, even though it is perceived that all MOP are accepted (Chart 4).

## 3.2 Demographics may mask more fundamental reasons for payment choices

Having controlled for the consumer perception of merchant acceptance, we next examine the consumer decision. The survey results confirm many of the demographic traits on cash usage found in previous studies. For example, those 55 years of age or older make 59 per cent of their transactions with cash, whereas those 34 or younger make only 48.9 per cent with cash. Those in the highest income bracket make about 47.4 per cent of their diary purchases with cash, compared with 65.2 per cent for incomes below $30 thousand (Table 3, column I). Therefore, the following question arises: Does the adoption and use of electronic alternatives to cash depend on demographic transitions, as new cohorts of individuals become more comfortable adopting and using them and real income levels rise?

Column II of Table 3 shows that the link between payment usage and income may be partly due to different shopping patterns. Columns I and II of Table 3 show that there is a negative correlation between average transaction values and cash payment shares. The fact that higher-income individuals undertake higher-value transactions may help explain why they use credit cards more intensively. Lower-income consumers, who make mostly smaller-value purchases, may shop more frequently at locations where only cash is accepted, becoming more cash intensive.

[11] Royston (2009) imputation techniques were used for about 10 per cent of the transactions in the diaries, to deal with missing values in the response to the diary question on which payment methods the individual believed were not accepted.

Column III of Table 3 shows that another reason for the differences in payment usage by income may be that low-income individuals have less access to alternative payment instruments, such as credit cards. An individual typically must meet a set of requirements based on their income and credit history before being accepted.[12] Moreover, column IV of Table 3 shows that higher-income individuals are more likely to have credit cards with rewards and, hence, have stronger incentives to make more intensive use of such cards.

In summary, there are underlying structural reasons that help explain why people with differing demographic traits have different payment patterns.

## 3.3 Beyond demographics: relative benefits and costs of alternative payment methods

One of the key features of the 2009 MOP survey is that it explores in detail the factors that could be considered as building blocks of consumers' preferences for different payment instruments. Chart 5 shows that security (in terms of fraud/theft/counterfeiting), as well as ease of use at the time of payment (in terms of time spent and the nuisance of having to make change, remember a PIN or sign for a purchase), are the top considerations for consumers when choosing a payment method. This is followed by costs (in terms of fees) and overall acceptance. A second set of attributes could be associated with cash flow and tracking expenditures such as anonymity, record keeping and the possibility of delaying the actual payment. Finally, controlling overspending and the potential to earn rewards rank near the bottom in terms of overall importance.

The survey also asked participants to rate different payment methods on a scale from 1 to 5 in terms of ease of use, costs, tracking spending and risks. As Table 4 shows, cash ranks highest in terms of ease of use and lowest costs, but lower in terms of record keeping (tracking). Debit and credit cards rank similarly, in most respects.

More importantly, we find a significant correlation between consumers' cash perceptions relative to alternative payment methods and payment intensity. Respondents who perceive that cash is relatively easier to use, better at tracking spending and cheaper than cards use relatively more cash compared to other payment instruments. The perceptions regarding cash relative to those regarding cards across demographic groups also provide clues about the demographic payment traits found in the literature. Table 5 reports the share of cash payments by demographic categories together with the average perception responses of cash relative to cards by payment instrument attribute. Numbers above (below) one represent measures above (below) the sample average. The table presents the puzzling result that older people use cash more intensively than

[12] In contrast, debit card ownership usually requires only that a person have a bank account. The percentage of people with at least one debit card did not vary to a significant degree by income in the survey.

younger people, despite the fact that older people have a relatively less favourable opinion about cash in terms of ease of use, risk of theft and acceptance. This may imply that older people pay with cash because they have to, rather than because they like cash relative to cards. In contrast, for high-income individuals, the limited record keeping capabilities and the higher risks of cash seem to weigh more heavily than the relatively higher costs and lower acceptance they associate with cards.

# 4. A Logit Model of the Choice of Cash at the Point of Sale

Simple bivariate correlations are illustrative, but as the previous section suggests, it is hard to draw firm conclusions from them. Age and income, for example, are associated with higher transaction values, which favour the use of cards as opposed to cash. Hence, in this section we use a simple logit model to analyze the determinants of an individual's choice of whether to use cash at the point of sale. The logit model exploits the information revealed in consumers' actual payment choices shown in the diaries to infer the underlying structure of their preferences.[13] The logit model allows us to separate the age and income effects from other factors such as payment instrument attributes, perceptions and transaction characteristics.

## 4.1 The logit model

The logit model starts with the assumption that consumers obtain a certain level of utility or satisfaction, $y^*$, by using cash in a given transaction. This utility is derived from the benefits that consumers experience using cash, such as speed and wide acceptance, net of the handling costs relative to other payment instruments. By using cash, for instance, consumers incur withdrawal costs and face certain risks of theft or loss.[14] In contrast, by using other payment methods, consumers may earn rewards and have access to credit, but may still be subject to certain risks of fraud.

However, instead of $y^*$, the data provide information on only the actual payment instrument choices made for a transaction, $y$. If $y = 1$ cash is used, this implies that the net benefit of cash relative to its alternatives is positive ($y^* > 0$). Otherwise, $y = 0$; i.e., consumers are better off choosing one of the alternatives to cash available to them, mainly credit or debit cards.[15]

If the utility function is of the form

[13] In the context of binary choices, the results of models such as the probit one produce very similar predictions.

[14] We do not consider the opportunity cost of holding cash balances, since the survey does not provide data for interest rates on savings accounts. However, this opportunity cost is likely to have been low in 2009, since Canadian short-term interest rates were close to zero in 2009 and cash holdings on hand were low ($70, on average; see Arango and Welte forthcoming).

[15] Although any MOP could be recorded in the diaries (e.g., cheques, stored-value cards, travellers cheques or online PayPal), 98 per cent of the transactions were conducted using either cash, debit or credit cards.

$$y^* = X'\beta + \varepsilon, \tag{1}$$

with an unobservable component ε that follows a logistic distribution F(ε), and $X'\beta$, which are observable factors that shift consumers' utility, then the probability that an individual chooses cash for a particular purchase is

$$\Pr(y = 1|X) = \Pr(y^* > 0|X) = \Pr(\varepsilon > -X'\beta) = \frac{e^{X'\beta}}{1+e^{X'\beta}}. \tag{2}$$

We estimate the model using the maximum likelihood function of the logit model, modified to use the survey weighting factors. This function is called the pseudomaximum likelihood function (Archer and Lemeshow 2006):

$$\ln L(\beta|x_i) = \sum_{i=1}^{n}\{(1-y_i)(w_i)\ln\left[1 - \frac{EXP(x_i'\beta)}{1+EXP(x_i'\beta)}\right] + y_i(w_i)\ln\left(\frac{EXP(x_i'\beta)}{1+EXP(x_i'\beta)}\right)\},$$

where $w_i$ is the weight associated with observation $i$.

## 4.2 Factors associated with payment behaviour

We consider several sets of factors that may be associated with the probability of paying with cash in the model of payment choice. The first set controls for consumer socioeconomic characteristics including age, income, education, gender, and marital and employment status.

The second set of variables are characteristics of the debit and credit card plans people have when they begin to complete the diary. We control for consumers' access to debit and credit cards, debit card fixed and per transaction fees, credit card rewards, and whether individuals pay their credit cards in full at the end of the month. The estimation results reported below focus on the individual's choices at the time of making a purchase. Hence, we assume that the features of the debit and credit cards consumers are holding are fixed, since consumers first shop around for banking services and seldom change their financial arrangements after making their decision. As for cash, we include cash holdings at the beginning of the 3-day diary.

The third set of variables controls for specific features of the transaction environment. In particular, we include the transaction value, the type of good or service purchased, the transaction venue (e.g., at a store or person-to-person), whether the transaction took place on a weekend, whether consumers perceived that debit and credit cards were accepted by the merchant, and the two most important reasons for choosing the payment instrument used.

Finally, we exploit the rich array of questions ranking the importance/usefulness of different payment instrument attributes such as ease of use, record keeping, security and budget control.

### 4.3 Marginal effects

Since the coefficients on a logit model are difficult to interpret, we report marginal effects or the change in the probability of using cash given a small change in an explanatory variable. In general, the marginal effect of a change in a variable in a logit model will depend on the value of $x \in X$ (see Train 2009).

For a continuous variable in a logit model, the marginal effect of a change in the $j$th explanatory variable $x_j$ is

$$\frac{d\Pr(y = 1|X;\beta)}{dx_j} = \frac{EXP(X'\beta)}{[1 + EXP(X'\beta)]^2}\beta_j.$$

For a factor variable such as a dummy, which takes only the value 1 or 0, the marginal effect is

$$\Pr(y = 1|x_j = 1;\beta) - \Pr(y = 1|x_j = 0;\beta),$$

which is simply the difference between the model-predicted probabilities of paying with cash when the dummy variable is true versus when it is false, holding all other variables constant.

## 5. Results

Table 6 shows the average marginal effects (AME) of the logit regression.[16] AME calculates the marginal effect of a variable for every transaction in the sample and takes the overall average of these marginal effects. The appendix provides definitions of the variables included in the model. The following are the most salient results, organized by sets of factors impacting cash usage at the point of sale.[17]

### 5.1 Participants' socioeconomic characteristics

The results reported in Table 6 under *Socioeconomic factors* show that income and age are both significantly associated with the use of cash at the point of sale. However, the differences in cash

[16] To test for model specification error, we use the link test by Pregibon (1980). The idea is that if the model is correctly specified, then an auxiliary logit model of cash with the linear prediction of $X'\beta$ from the original model and the prediction squared as regressors should show that the squared prediction has no explanatory power. The coefficient on the prediction squared is 0.01 with a $p$-value of 0.4. We therefore have no evidence that the coefficient on the prediction squared has any explanatory power; hence, there is no evidence of model misspecification.

[17] Strictly speaking, our results should be interpreted as deriving from a model of conditional probabilities, since we do not claim that some of the factors associated with the probability of paying with cash are direct drivers of consumers' payment decisions.

usage between income and age groups depend importantly on whether the individual has access to a credit card.

To see this, note that the age and income categorical dummies enter the regression both alone and through interaction with the credit card ownership dummy. The stand-alone AMEs show the differences between individuals without access to a credit card. Those in the middle-income bracket ($50K–$80K) use significantly more cash than those in the other income brackets (AME = 0.109, or an 11 percentage-points-higher probability of using cash).[18] Also, the oldest individuals (AME = 0.102) use more cash than the youngest age group.

For individuals with access to a credit card, however, there is no significant difference in cash usage between the different age and income groups. Among those with a credit card, the difference in the probability of using cash between age and income categories depends on the sum of the stand-alone coefficients on the age/income categories and the coefficient on the interaction of the age/income category and the credit card ownership dummy. For example, the AME on cash usage for an individual who earns between $50K and $80K and owns a credit card is (0.109) + (-0.100) = 0.009, which is negligible. Performing the same exercise for the other age and income groups produces similar results.[19]

It could be argued that the lack of significance of age and income is due to the collinearity between them and the other explanatory variables in the model. For example, the perceived ease of use of cash may be correlated with age. Correlation analysis, however, shows that even though there is some correlation between income and age, and participants' perceptions and attitudes toward different payment instrument attributes, such correlations are relatively low.[20] Furthermore, the results may not be surprising given that the markets for debit and credit cards are relatively mature in Canada. Therefore, personal differences in perceived benefits and costs of alternative payment instruments, regardless of demographics, would have more weight in consumer payment choices among those with access to all payment methods.

Less than 5 per cent of participants do not have a debit card, and their probability of paying with cash is about 5 percentage points higher than for those carrying a debit card. This is shown in Table 6, where the AME of the dummy on debit card ownership is -0.048.

---

[18] As we present the results, a good point of reference regarding the magnitude of the AME is to compare them with the actual proportion of transaction volumes in the sample done with cash, which is 54 per cent.

[19] Tests on the linear hypothesis that the coefficient on an age or income category plus the coefficient on its interaction with credit card ownership equals 0 fail to reject this hypothesis at the 5 per cent significance level.

[20] Arango and Taylor (2009b) and Schuh and Stavins (2010) highlight the weak correlation between perceptions of payment instrument attributes and demographics.

All things equal, other socioeconomic factors such as education, gender, employment status, urban/rural, financial knowledge and whether the individual is active in the household finances are not statistically significant.

## 5.2 Debit/credit card plans and access to cash

The results reported in Table 6 under *Card plans and cash holdings* show that the use of cash varies significantly with the type of debit or credit card and the amount of cash consumers have on hand at the beginning of their diary.

As would be expected, the results of the logit model show that the probability of using cash for those participants holding debit cards with either more than 20 or unlimited free transactions (AME = -0.066) is about 7 percentage points lower than those with fewer free transactions.[21] In fact, unlimited debit transactions are often offered by plans that charge monthly fees or are subject to minimum bank account balances. By having this type of plan, consumers have stronger incentives to use debit cards than those who pay per-transaction fees.[22]

Having a credit card with rewards also influences the probability of using cash.[23] In the model, we include the product of a dummy on whether a person's credit card has rewards and transaction value. This specification follows from the fact that most credit card rewards are proportional to the transaction value.[24] We can see from the results in Table 6 that a marginal increase in credit card rewards decreases the probability of using cash (AME = -0.001). However, the effects are small relative to other dimensions of the payment choice. This is illustrated in Chart 6, which uses the logit model to estimate predicted probabilities[25] across transaction values for individuals with no rewards on their credit card (dotted red line) versus a base case (blue line) that considers individuals with rewards. For Charts 6 through 10, the base case involves fixing consumer characteristics at their average value across all transactions. For variables that change with transaction values, the average values across each transaction value range are used.[26]

We interpret cash balances at the beginning of the diary as a proxy for the marginal cost that consumers face in paying with cash. The more cash an individual has on hand, the lower the

[21] 69 per cent of survey participants own debit cards with 20 or more free transactions per month.
[22] These results are consistent with those found by Borzekowski, Kiser and Shaista (2008).
[23] As will be discussed later, other credit and debit card attributes, such as ease of use at some transactions, payment delay in the case of credit cards, and record keeping have a larger effect than rewards on the choice between cash and cards.
[24] 70 per cent of survey participants who own a credit card have an associated reward plan.
[25] Predicted probabilities are calculated based on equation (2) using the parameter estimates of the logit model $\beta$ and specific values for the variables included in $X$.
[26] In a multinomial discrete-choice model of cash, debit and credit, Arango, Huynh and Sabetti (2011) look closer into the substitution patterns between the three payment methods and find that, although credit card rewards reduce the use of both cash and debit cards, the effect is significantly larger on the latter payment instrument.

probability of having to make a trip to get cash or of missing a purchase, as, for example, when consumers do not have enough cash and cannot pay with another payment instrument. The model indicates that having greater cash balances on hand increases the probability of using cash for all transactions (AME = 0.001 for cash holdings at the beginning of the diary). However, if the value of the transaction is high relative to cash holdings, consumers tend to hold on to their liquidity and therefore it is less probable that they will pay with cash. This can be seen through the coefficient on the ratio of the transaction value and initial cash holdings (AME = -0.013).

Chart 7 shows the total effect of cash holdings on the probability of using cash as the transaction value rises. In contrast to Chart 6, the dotted red line represents the alternative case of having very low cash balances ($5 in our simulation) at the beginning of the diary. Having low initial cash on hand reduces the probability of using cash, and the reduction (the ratio between the two lines) increases with higher transaction values. For transaction values between $25 and $50, it could be almost half as likely that consumers with low cash holdings would use their liquidity or withdraw additional cash to complete the transaction, compared to the base-case situation.

## 5.3 Transaction characteristics

Transaction characteristics matter: the value of a payment attribute may depend on them. As shown earlier, card acceptance varies by transaction value, while speed may also be at a premium in places with high shopping traffic. Safety may be perceived as greater in high-transaction-value stores. Paying with cards at the gas pump may save a trip inside the station, compared to paying with cash.

The results reported in Table 6 under *Transaction characteristics* show that the two most important variables explaining why cash is frequently used in low-value transactions are the lack of acceptance of alternatives to cash and ease of use or speed. However, other cash attributes, such as anonymity, also matter at the POS.

Indeed, the probability of paying with cash decreases almost 30 percentage points, on average, when consumers perceive that both debit and credit cards are accepted by merchants (AME = -0.308 on the dummy for cash, debit and credit perceived as accepted in Table 6). Chart 8 shows the baseline scenario with the observed card acceptance levels versus the predicted probability of using cash across transaction amounts when an individual believes cards are accepted. For the latter scenario, the purchaser is less likely to use cash and the reduction in the probability of using cash is greatest for low-value transactions.[27]

[27] Future work should analyze the formation of consumers' acceptance beliefs. By obtaining data on actual acceptance by geographic codes, as in Rysman (2007), one could measure the level of consumers' choice "inefficiencies" due to misinformation. Note, however, that even if merchants accept a payment method, they could, in principle, dissuade consumers from using it either through fees or minimum transaction restrictions.

The diary also asked for the two most important reasons for choosing a particular payment instrument. Reasons included were: ease of use or speed, avoid fees, delay payment and avoid fraud/theft/counterfeiting. The model results show that for transactions where the most important reason for choosing a payment instrument was ease of use or speed, the probability of paying with cash is about 20 percentage points higher (AME = 0.204). Chart 9 illustrates the importance of ease of use in the probability of using cash as we alter the transaction value. Again, this chart plots the base case against an alternative case, this time setting the variable ease of use as the top reason equal to 0 (see the appendix for a description of this variable). Note that making ease of use unimportant for choosing a payment method in the model substantially reduces the use of cash, particularly in lower-value transactions.[28]

The results in Table 6 also show that for transactions where avoiding fees and avoiding fraud were the top reasons for choosing a payment method, the probability of paying with cash is substantially higher (AME = 0.111 and AME = 0.079, respectively). These results highlight the unique advantages of cash in terms of anonymity, and point to a substitution toward cash where consumers might face merchant surcharging if using a payment card.[29] However, when delaying the payment is the main reason behind making a payment instrument choice, the probability of paying with cash drops by some 20 percentage points (AME = -0.207).

The type of good purchased also influences a person's decision on whether to use cash. Using groceries/drugs as the base category, the model estimates show that the probability of using cash falls when the good type is gasoline (AME = -0.045), and travel/parking (AME = -0.147), but increases when it is entertainment/meals (AME = 0.059). The model results also show that cash is predominant in transactions where the buyer and the seller are physically present, such as at a store or person-to-person.

## 5.4 Participant perceptions and attitudes toward payment instrument attributes

The previous section analyzed why cash usage varies across transaction types. In this section, we analyze why cash usage varies among consumers. The model shows that differences in perceived benefits and costs of paying with cash among consumers are strongly associated with differences in their payment behaviour.

We add measures of respondents' perceived overall satisfaction with the ease of use, costs and ability of cash to track spending relative to debit and credit cards. We also include participants' attitudes toward record keeping, security and control of overspending. The estimates reported in Table 6 under *Perceptions and attitudes* show that differences in consumers' perceived costs of

[28] Klee (2008) also finds speed to be a significant factor in the use of cash and alternative payment instruments.
[29] For example, some retailers charge a card payment fee if transactions are below a certain threshold.

using cash (AME = -0.141), ease of use (AME = 0.318) and record keeping capabilities (AME = 0.185) are significant factors explaining the probability of using cash with the expected signs. Furthermore, cash seems to play an important role as a way to keep spending within budget, since those consumers particularly worried about overspending use cash more intensively (AME of importance of controlling overspending = 0.041).

There are various reasons why consumers may differ in their perceptions of the benefits and costs of using cash. Those who are more careful about checking change, worry about currency counterfeiting or do not like coins may find cards easier to use. For some, accessing cash may be more costly in terms of ATM access and fees. Some individuals see cash as being good for tracking expenses, since cash balances can be checked at any time; alternatively, some may have a strong aversion to leaving a record of their transactions or personal information, or may not wish to keep track of small-value purchases. Others may find it more difficult to check card statements online or handle personal credit lines.[30]

We use the model to specify a scenario where cards are accepted everywhere, are as easy to use as cash and cash withdrawals are considered costly (proxied by low cash balances). Such a scenario could resemble the case where debit, credit or contactless payments (where a payment instrument can be simply waved over a terminal without the need for a signature or PIN) become ubiquitous and where cash access is made costly by, for example, increasing withdrawal fees. Chart 10 shows that, in such a scenario, the probability of paying with cash would be less than a fourth of that in the current environment. The chart also highlights the explanatory power of our model: it helps explain most of the high probability of paying with cash in low-value transactions.[31]

## 6. Conclusion

In this paper, we use the Bank of Canada's 2009 Methods-of-Payment survey to study why cash is still so frequently used. We find that about 6 out of 10 cash transactions are undertaken because of either speed or lack of acceptance of alternatives to cash, or because cash is easily available. These factors are especially relevant in explaining why cash accounts for about 70 per cent of the payment volume for transactions below $25. Debit cards and credit cards, on the other hand, dominate in higher-value transactions, where they are generally accepted by merchants, speed is not as relevant, credit card rewards are more generous, delaying a payment is more attractive and people prefer to hold on to their cash balances.

---

[30] The significance of consumer heterogeneity in preferences for cash due to its budgeting and overspending control properties, as well as its lack of tracking records, is consistent with the results found in von Kalckreuth, Schmidt and Stix (2011) and Schuh and Stavins (2010).

[31] The effect of transaction value on payment choices is documented in other studies such as Klee (2008) and Bounie and Francois (2006).

However, consumers differ in the way they perceive cash attributes. We find that there are consumers who are more cash intensive, since they use cash to avoid fraud, and because of its simplicity as a tool in controlling spending.

The results suggest that payment innovations that are easy to use and widely accepted may cause substantial reductions in cash usage, especially for transactions below $25, where we estimate that annual cash volumes are 6.2 billion transactions, about the same as the current combined volume of debit and credit card payments.

One example of such an innovation is the contactless feature (where a payment instrument can be simply waved over a terminal without the need for a signature or PIN) in some Interac debit cards (Flash) and Visa (payWave) and MasterCard (PayPass) credit cards. Such payment cards would be more competitive with cash in terms of speed and ease of use. Although contactless card features were just introduced in Canada a few years ago, there is already evidence of their effect on cash usage (Fung, Huynh and Sabetti 2011). More recent innovations allow debit and credit payments through mobile phones, as well as make credit card payments quicker for low-value transactions by eliminating the requirement to provide a signature. However, merchants, especially those with high transaction volumes and low transaction values, must be given the right incentives to accept these innovations, since it may involve the upgrading of existing equipment or the purchase of new equipment.

Future work with the 2009 MOP survey should allow researchers to develop more elaborate models of payment instrument usage. For example, to explore competition between debit and credit cards at the point of sale, it is important to understand the factors underlying both consumer selection of different debit and credit card plans and merchants' decisions regarding payment card acceptance.

## References


Arango, C., K. P. Huynh and L. Sabetti. 2011. "How Do You Pay? The Role of Incentives at the Point-of-Sale." Bank of Canada Working Paper No. 2011-23.

Arango, C. and V. Taylor. 2008–09. "Merchants' Costs of Accepting Means of Payment: Is Cash the Least Costly?" *Bank of Canada Review* (Winter): 15–23.

———. 2009a. "Merchant Acceptance, Costs, and Perceptions of Retail Payments: A Canadian Survey." In *Evolving Payment Habits*, Chapter 5, 99–142. Edited by H. Leinonen. Proceedings of the Bank of Finland Payment Habits Seminar 2008. Helsinki: Bank of Finland.

———. 2009b. "The Role of Convenience and Risk in Consumers' Means of Payment." Bank of Canada Discussion Paper No. 2009-8.

Arango, C. and A. Welte. "The Bank of Canada's 2009 Methods-of-Payment Survey: Methodology and Key Results." Bank of Canada website (forthcoming).

Archer, K. J. and S. Lemeshow. 2006. "Goodness-of-Fit Test for a Logistic Regression Model Fitted Using Survey Sample Data." *The Stata Journal* 6 (1): 97–105.

Baxter, W. F. 1983. "Bank Interchange of Transactional Paper: Legal and Economic Perspectives." *Journal of Law and Economics* 26 (3): 541–88.

Bolt, W. and S. Chakravorti. 2008. "Economics of Payment Cards: A Status Report." *Federal Reserve Bank of Chicago Economic Perspectives* 32 (4): 15–27.

Borzekowski, R., E. Kiser and A. Shaista. 2008. "Consumers' Use of Debit Cards: Patterns, Preferences, and Price Response." *Journal of Money, Credit and Banking* 40 (1): 149–72.

Bounie, D. and A. Francois. 2006. "Cash, Check or Bank Card? The Effects of Transaction Characteristics on the Use of Payment Instruments." Telecom Paris Economics and Social Sciences Working Paper No. ESS-06-05.

Foster, K., E. Meijer, S. Schuh and M. A. Zabek. 2010. "The 2008 Survey of Consumer Payment Choice." Federal Reserve Bank of Boston Public Policy Discussion Paper No. 09-10.

Fung, B. S., K. Huynh and L. Sabetti. 2011. "Retail Payments Innovation and the Demand for Cash in Canada." Bank of Canada. Photocopy.

Hoffmann, A., H. Wörlen, A. Friedrich, N. Knaust, U. von Kalckreuth and T. Schmidt. 2009. "Payment Behaviour in Germany: An Empirical Study of the Selection and Utilisation of Payment Instruments in the Federal Republic of Germany." Deutsche Bundesbank. Available at <http://www.bundesbank.de/download/bargeld/pdf/bargeld_studie.en.pdf>.

Jonker, N. and A. Kosse. 2009. "The Impact of Survey Design on Research Outcomes: A Case Study of Seven Pilots Measuring Cash Usage in the Netherlands." De Nederlandsche Bank Working Paper No. 221.

Klee, E. 2008. "How People Pay: Evidence from Grocery Store Data." *Journal of Monetary Economics* 55 (3): 526–41.

Mooslechner, P., H. Stix and K. Wagner. 2006. "How Are Payments Made in Austria? Results of a Survey on the Structure of Austrian Households' Use of Payment Means in the Context of Monetary Policy Analysis." *Monetary Policy & the Economy* 2: 111–34.

Pregibon, D. 1980. "Goodness of Link Tests for Generalized Linear Models." *Applied Statistics* 29 (1): 15–24.

Rochet, J-C. and J. Tirole. 2002. "Cooperation Among Competitors: Some Economics of Payment Card Associations." *The Rand Journal of Economics* 33 (4): 549–70.

———. 2003. "Platform Competition in Two-Sided Markets." *Journal of the European Economic Association* 1 (4): 990–1029.

———. 2006. "Two-Sided Markets: A Progress Report." *The Rand Journal of Economics* 37 (4): 645–67.

Royston, P. 2009. "Multiple Imputation of Missing Values: Further Update of ICE, with an Emphasis on Categorical Variables." *The Stata Journal* 9 (3): 466–77.

Rysman, M. 2007. "An Empirical Analysis of Payment Card Usage." *Journal of Industrial Economics* 55 (1): 1–36.

Schuh, S. and J. Stavins. 2010. "Why Are (Some) Consumers (Finally) Writing Fewer Checks? The Role of Payment Characteristics." *Journal of Banking & Finance* 34 (8): 1745–58.

Taylor, V. 2006. "Trends in Retail Payments and Insights from Public Survey Results." *Bank of Canada Review* (Spring): 25–36.

Train, K. E. 2009. *Discrete Choice Methods with Simulation*. Second edition. Cambridge: Cambridge University Press.

von Kalckreuth, U., T. Schmidt and H. Stix. 2011. "Using Cash to Monitor Liquidity – Implications for Payments, Currency Demand and Withdrawal Behaviour." European Central Bank Working Paper No. 1385.

**Table 1**
**Point-of-Sale Transaction Value by Payment Method – 2009 MOP Survey[a]**

| Method of payment | Median value | Average value |
|---|---|---|
| **Cash** | $8.0 | $16.9 |
| **Credit** | $40.0 | $84.4 |
| **Debit** | $29.0 | $51.3 |
| **Cheque** | $60.0 | $195.6 |
| **Stored-value card** | $4.8 | $26.8 |

a. Based on 15,784 transactions from the 3-day diaries.

**Table 2**
**Perceived Acceptance of Cards by Merchant Size and Transaction Values (survey diaries)[a]**

| | Transaction values | | | |
|---|---|---|---|---|
| **Merchant size (number of cashiers)** | $0-$15 | >$15-$25 | >$20-$50 | >$50 |
| **1** | 41.1% | 65.6% | 76.5% | 81.4% |
| **2 to 5** | 57.3% | 71.6% | 80.4% | 86.9% |
| **>6** | 68.4% | 76.1% | 84.8% | 87.5% |

a. Based on 15,784 transactions. Proportion of transactions where individuals thought cards were accepted.

**Table 3**
**Household Income and Payment Choices**

| | I | II | III | IV |
|---|---|---|---|---|
| **Income** | **% of cash transactions in the diaries[a]** | **Mean transaction value in the diaries ($)[b]** | **% of people with at least 1 credit card[b]** | **% of credit card owners with rewards[b]** |
| **<$30K** | 65.2% | $33.23 | 53.1% | 54.5% |
| **$30K-<$60K** | 56.5% | $34.86 | 77..0% | 63.8% |
| **$60K-<$100k** | 52.8% | $39.47 | 85.3% | 70.1% |
| **$100K+** | 47.4% | $47.43 | 94.0% | 78.2% |
| | 15,795 | 6,868 | 6,868 | 5,753 |

a. Based on the 3-day survey diaries (15,776 transactions). b. Based on the survey questionnaires.

**Table 4**
**Consumer Perceptions of Various Payment Instrument Attributes (share of respondents with highest rating)[a]**

| Method of payment | Ease of use (% very easy to use) | Tracking spending (% very useful) | Cost (% not at all costly) | Potential financial loss (not at all significant) |
|---|---|---|---|---|
| **Cash** | 79.0% | 26.8% | 71.8% | 17.3% |
| **Debit card** | 72.4% | 50.5% | 32.1% | 10.1% |
| **Credit card** | 75.6% | 53.6% | 28.9% | 12.2% |
| **Stored-value card** | 45.0% | 18.6% | 45.8% | 31.3% |

a. Based on 6,868 respondents. Numbers show the share of respondents who chose the highest rating for each attribute.

**Table 5**
**Consumer Perceptions of Cash Relative to Debit and Credit Cards by Payment Attribute**

| | % of cash transactions in the diaries[a] | Ease of use[b] | Tracking spending[b] | Costs[b] | Risk of theft/fraud[b] | Potential financial loss[b] | Acceptance |
|---|---|---|---|---|---|---|---|
| Overall | 53.8 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| **Age** | | | | | | | |
| 18 - 34 | 48.9 | 1.18 | 1.00 | 1.00 | 0.86 | 1.05 | 1.12 |
| 35 - 54 | 53.9 | 0.97 | 0.99 | 1.06 | 0.97 | 0.99 | 0.99 |
| 55- 75 | 59.0 | 0.84 | 1.02 | 0.92 | 1.21 | 0.96 | 0.87 |
| **Income** | | | | | | | |
| <30 K | 65.2 | 1.33 | 1.16 | 1.11 | 0.88 | 0.87 | 0.95 |
| 30 to 60 K | 56.5 | 0.76 | 1.04 | 1.09 | 1.13 | 0.98 | 0.90 |
| 60 to 100 K | 52.8 | 0.95 | 0.98 | 1.02 | 0.96 | 1.01 | 1.00 |
| 100 K plus | 47.4 | 1.11 | 0.89 | 0.84 | 0.98 | 1.08 | 1.13 |
| **Gender** | | | | | | | |
| Female | 54.1 | 0.84 | 1.00 | 1.07 | 0.94 | 0.95 | 0.99 |
| Male | 54.3 | 1.18 | 1.00 | 0.93 | 1.07 | 1.05 | 1.01 |
| **Density** | | | | | | | |
| Urban | 53.9 | 0.96 | 0.99 | 1.00 | 1.01 | 1.00 | 1.03 |
| Rural | 55.2 | 1.13 | 1.04 | 1.00 | 0.98 | 0.99 | 0.91 |
| **Responsible for household finances** | | | | | | | |
| Not responsible | 53.6 | 1.11 | 1.03 | 0.96 | 1.07 | 1.02 | 1.05 |
| Responsible | 54.6 | 0.93 | 0.98 | 1.02 | 0.95 | 0.99 | 0.97 |

a. Based on the survey diaries (15,776 transactions). b. Based on the 6,868 participants' questionnaires.

**Table 6**
**Logit Model**

| | Average marginal effects | *p*-value |
|---|---|---|
| ***Socioeconomic factors*** | | |
| Household income (less than $30K comparison group) | | |
| $30K-$50K | -0.045 | 0.166 |
| $50K-$80K | 0.109*** | 0.002 |
| $80K plus | 0.000 | 0.992 |
| Age (less than 35 comparison group) | | |
| 35 to 55 years old | 0.001 | 0.966 |
| 55 or older | 0.102*** | 0.006 |
| Interactions of income and credit card ownership dummy | | |
| $30K-$50K) and credit card ownership | 0.047 | 0.180 |
| $50K-$80K) and credit card ownership | -0.100*** | 0.006 |
| $80K plus) and credit card ownership | 0.032 | 0.453 |
| Interactions of age and credit card ownership dummy | | |
| 35 to 55 years old and credit card ownership | 0.008 | 0.779 |
| 55 or older and credit card ownership | -0.104*** | 0.005 |
| Credit card ownership | 0.013 | 0.666 |
| Debit card ownership | -0.048*** | 0.008 |
| Education (finished high school comparison group) | | |
| Some technical school/university | -0.005 | 0.719 |
| University or graduate degree | -0.020 | 0.176 |
| Family Size | -0.010* | 0.041 |
| Male | 0.010 | 0.318 |
| Rural | 0.006 | 0.643 |
| Not Married | 0.014 | 0.332 |
| Renter | 0.074*** | 0.000 |
| Interaction of renter and not married | -0.088*** | 0.000 |
| Full time employed | 0.004 | 0.685 |
| Home access to internet | -0.013* | 0.429 |
| Responsible for household finances | 0.009 | 0.377 |
| Financial knowledge | 0.004 | 0.565 |

Note: ***, ** and * statistically significant at 1 per cent, 5 per cent and 10 per cent, respectively. Likelihood estimation accounting for survey weights using Stata survey environment. Marginal effects calculated as the average of the marginal effect across all observations. Transactions above $1,000 excluded as outliers.

**Table 6 (continued)**
**Logit Model**

| | Average marginal effects | *p*-value |
|---|---|---|
| ***Card plans and cash holdings*** | | |
| Debit card with more than 20 or unlimited free transactions | -0.066*** | 0.000 |
| Debit card monthly fee | -0.001 | 0.925 |
| Credit card with contactless feature | -0.010 | 0.431 |
| Reward dummy multiplied by transaction value | -0.001** | 0.003 |
| Reward dummy multiplied by transaction value squared | 0.000** | 0.016 |
| Credit card revolver (does not pay credit card balances in full) | -0.015 | 0.192 |
| Cash holdings at beginning of the diary | 0.001*** | 0.000 |
| Cash holdings squared | -0.000*** | 0.005 |
| Transaction value divided by cash holdings | -0.013** | 0.001 |
| Transaction value divided by cash holdings squared | 0.000*** | 0.008 |
| ***Transaction characteristics*** | | |
| Transaction value | -0.003*** | 0.000 |
| Transaction value squared | 0.000*** | 0.000 |
| Transaction channel (at a store comparison group) | | |
| By mail | -0.287*** | 0.004 |
| By phone/Internet | -0.232*** | 0.000 |
| Person to person (not at a store) | 0.126*** | 0.000 |
| Other (e.g. at a bus, booth) | 0.045* | 0.106 |
| Type of good/service (groceries comparison group) | | |
| Gasoline | -0.045*** | 0.015 |
| Personal attire/ Hobby or sporting goods/ durable goods | -0.023** | 0.109 |
| Health Care | -0.066 | 0.121 |
| Professional/personal services | -0.057* | 0.206 |
| Travel/parking | -0.147*** | 0.000 |
| Entertainment/meals | 0.059*** | 0.000 |
| Other | 0.044*** | 0.004 |
| Cash, debit and credit cards perceived as accepted | -0.308*** | 0.000 |
| Ease of use/speed as top reason | 0.204*** | 0.000 |
| Avoid fees as top reason | 0.111*** | 0.000 |
| Delay payment as top reason | -0.207*** | 0.000 |
| Avoid fraud as top reason | 0.079*** | 0.000 |
| Weekend | -0.007 | 0.469 |

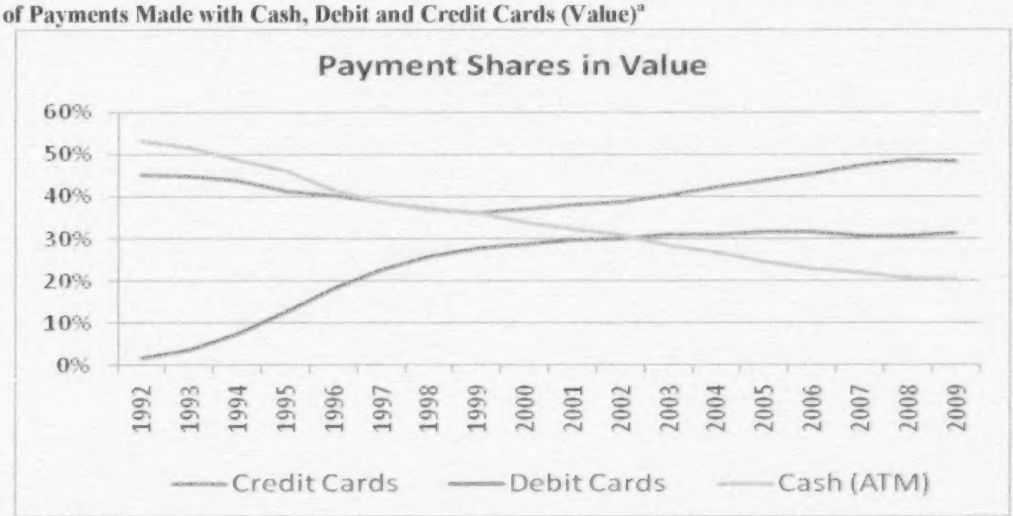
Note: ***, ** and * statistically significant at 1 per cent, 5 per cent and 10 per cent, respectively. Likelihood estimation accounting for survey weights using Stata survey environment. Marginal effects calculated as the average of the marginal effect across all observations. Transactions above $1,000 excluded as outliers.

**Table 6 (continued)**
**Logit Model**

| | Average marginal effects | *p*-value |
|---|---|---|
| ***Perceptions and attitudes toward payment instrument attributes*** | | |
| Perceived ease of use of cash relative to cards | 0.318*** | 0.005 |
| Perceived cost of cash relative to cards | -0.141** | 0.004 |
| Perceived record keeping ability of cash relative to cards | 0.185*** | 0.000 |
| Importance of payment attributes relative to ease of use | | |
| Importance of costs | -0.041** | 0.015 |
| Importance of record keeping | -0.015 | 0.454 |
| Importance of acceptance | 0.001 | 0.965 |
| Importance of controlling overspending | 0.041*** | 0.003 |
| Importance of anonymity | 0.022 | 0.146 |
| Importance of security | -0.011 | 0.592 |
| Constant | NA | |
| Number of observations | 14,372 | |
| F test (*p*-value) | 23.318 | 0.000 |

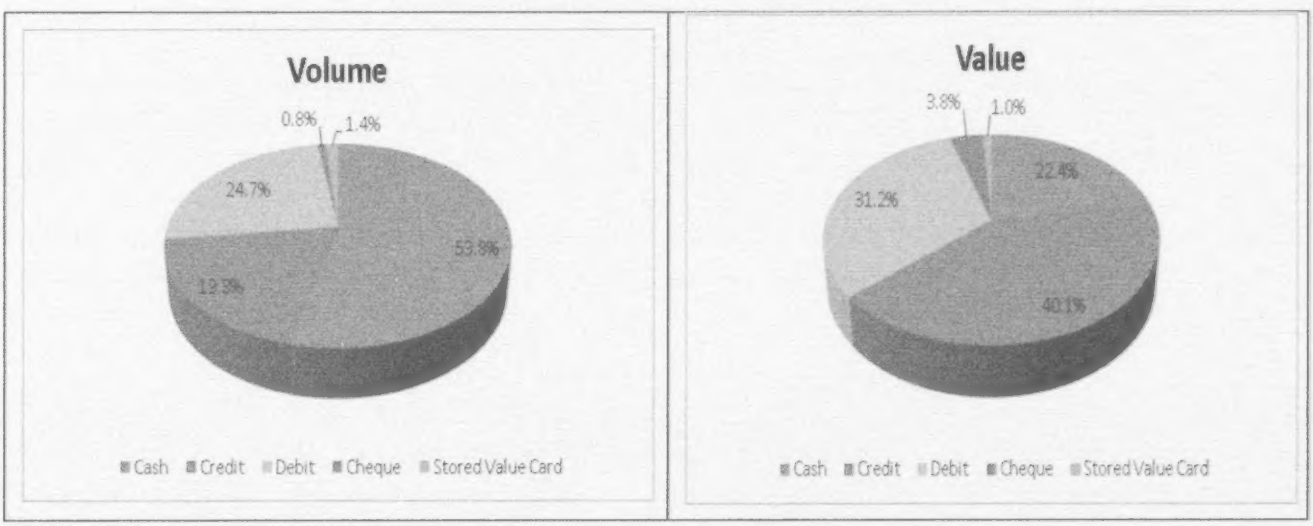
Note: ***, ** and * statistically significant at 1 per cent, 5 per cent and 10 per cent, respectively. Likelihood estimation accounting for survey weights using Stata survey environment. Marginal effects calculated as the average of the marginal effect across all observations. Transactions above $1,000 excluded as outliers.

**Chart 1**
**Share of Payments Made with Cash, Debit and Credit Cards (Value)[a]**



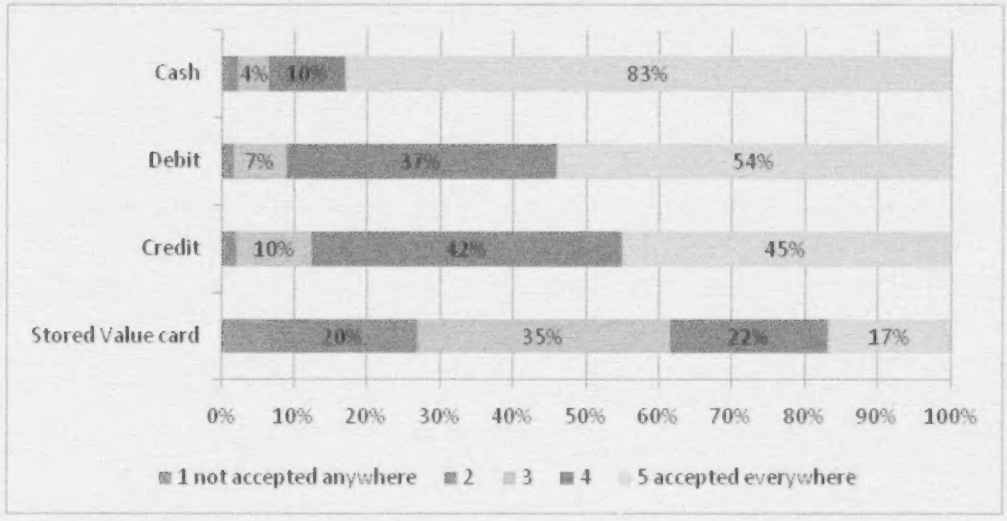

a. Cash values based on ATM withdrawals. Values of debit and credit card transactions are based on annual public statistics provided by Interac, Visa and MasterCard.

**Chart 2**
**Aggregate Volume and Value Shares by Payment Method – 2009 MOP Survey[a]**



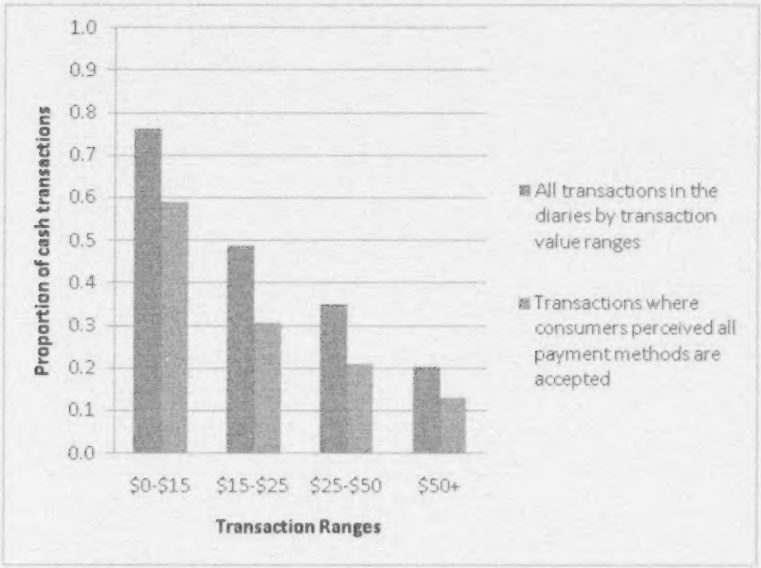

a. Based on 15,891 transactions. Taken from the 3-day diaries.

**Chart 3**
**Perceived Acceptance for Cash, Debit and Credit Cards[a]**




a. Percentages indicate share of respondents answering for each acceptance level (1 to 5). Based on the 6,868 survey questionnaires.

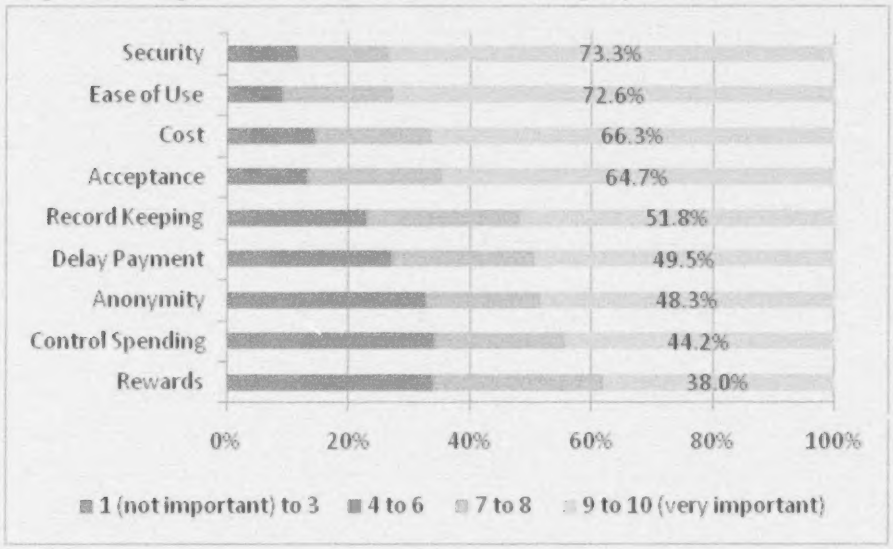
**Chart 4**
**The Effect of Acceptance on Cash Use[a]**




a. Based on 15,913 transactions from the 3-day diaries.

**Chart 5**

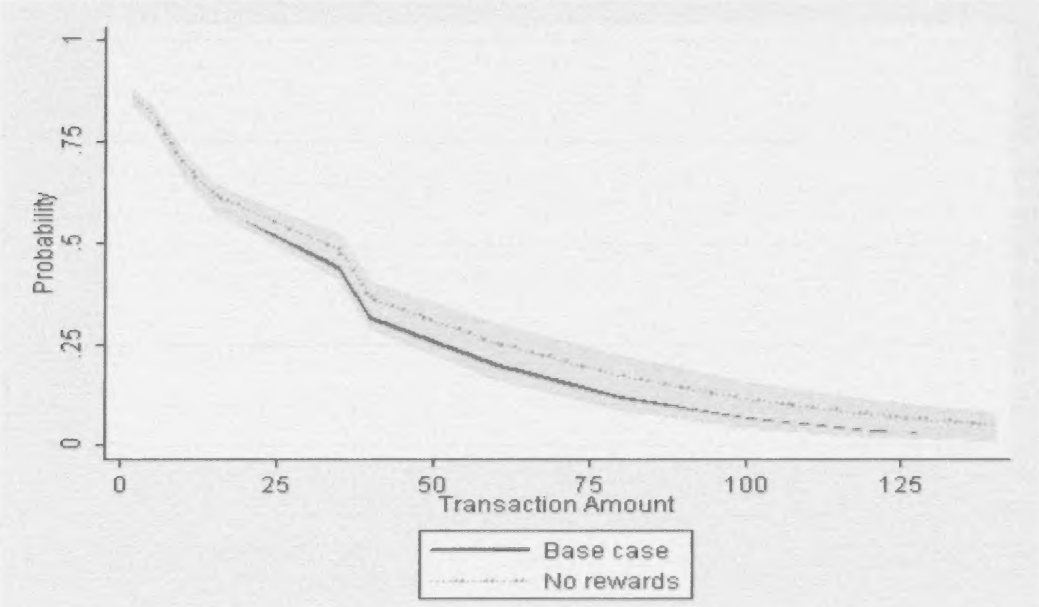
**Responses on Importance of Various Factors in Choosing Payment Method to Use[a]**




a. Individuals were asked in the survey questionnaire to rate a list of attributes in terms of their importance when considering what type of payment method to use. The chart shows the breakdown of responses for each attribute.

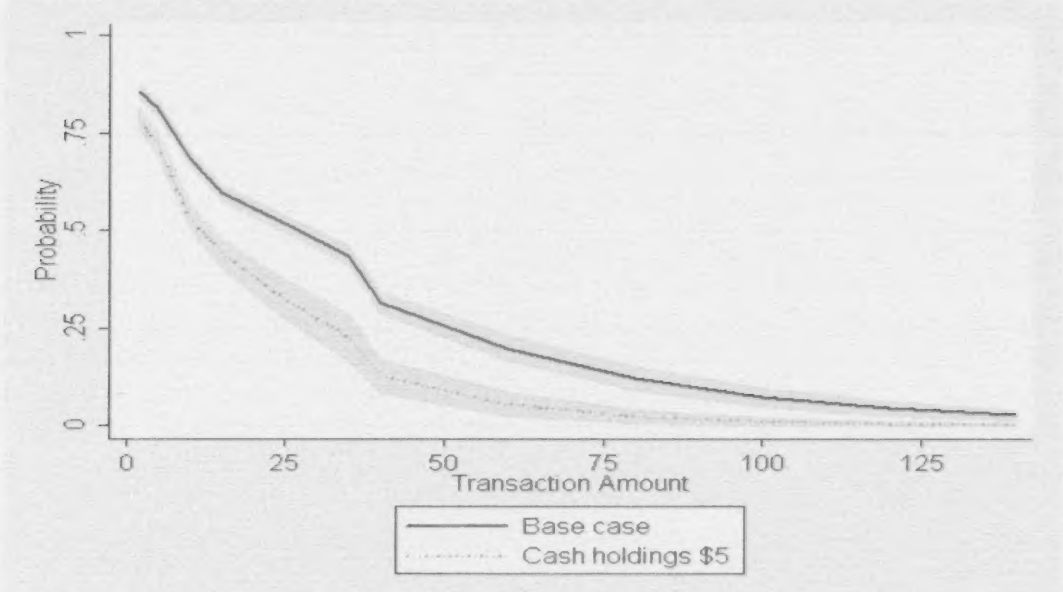
**Chart 6**

**The Effect of Credit Card Rewards on the Probability of Using Cash[a]**



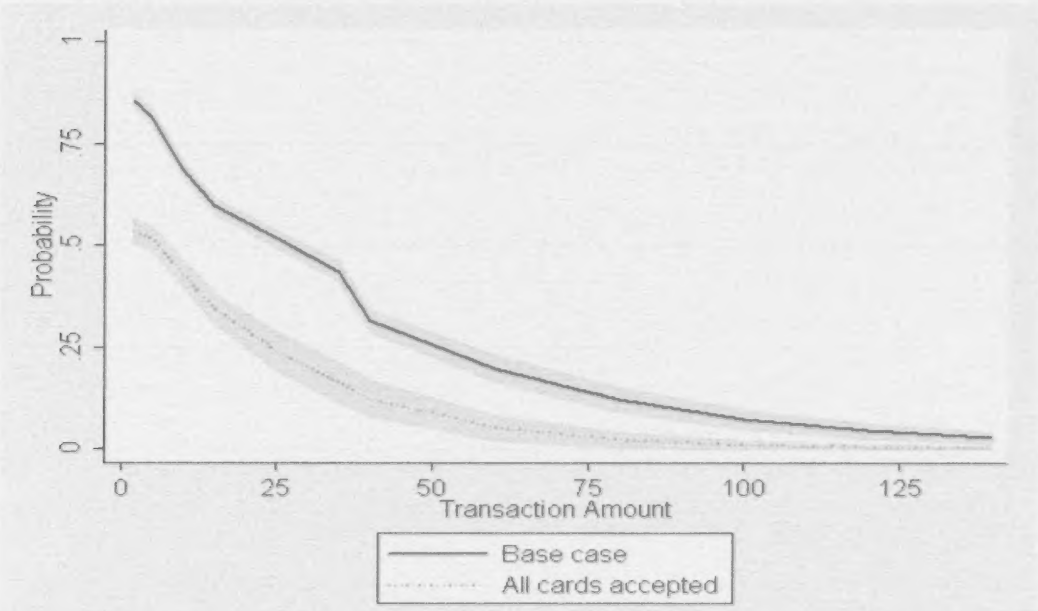

a. Shaded area represents 95 per cent confidence interval. Base case represents average value of regressors, including a 0.75 per cent rebate on credit card purchases

**Chart 7**
**Costly Access to Cash and Cash Usage[a]**



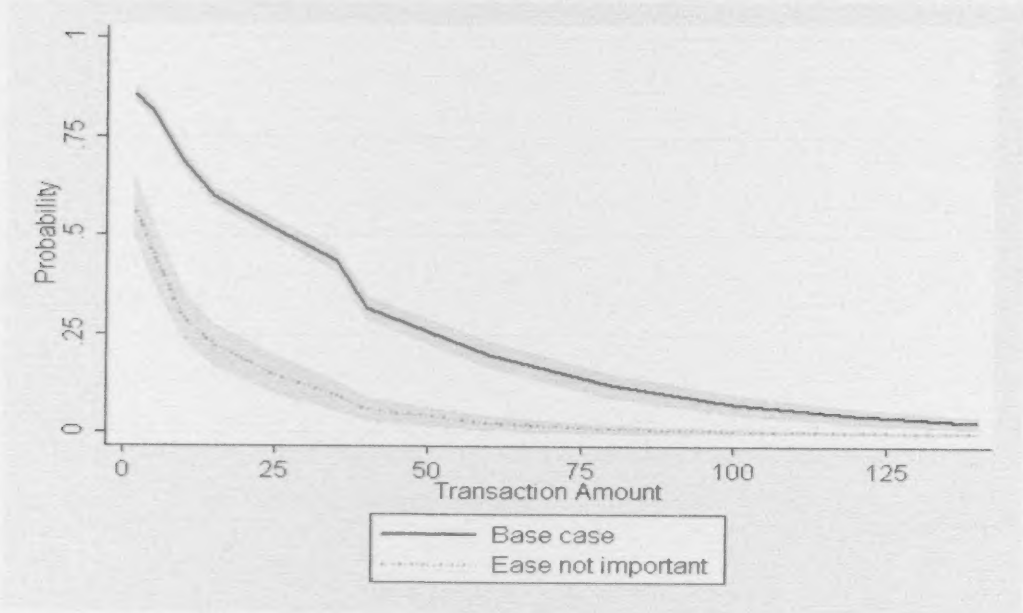

a. Shaded area represents 95 per cent confidence interval. Base case represents average value of regressors, including the average starting cash balance at day 1 of the shopping diary.

**Chart 8**
**The Effect of Acceptance on the Probability of Using Cash[a]**



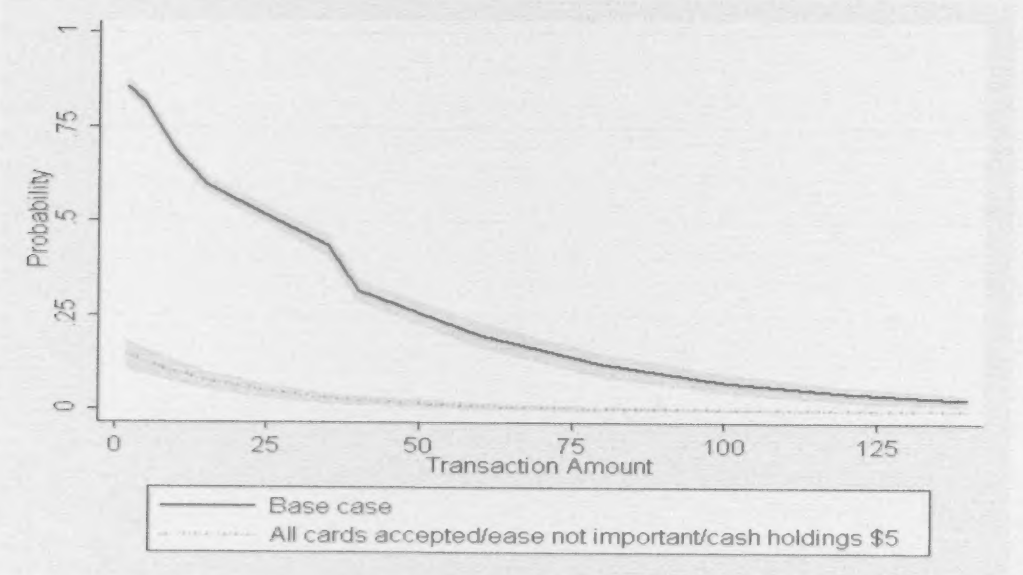

a. Shaded area represents 95 per cent confidence interval. Base case represents average value of regressors, including the proportion of places that accept all cards at different transaction values.

**Chart 9**
**Ease of Use or Speed and the Probability of Using Cash[a]**




a. Shaded area represents 95 per cent confidence interval. Base case represents average value of regressors, including the proportion of transactions where ease of use was the top reason by transaction ranges.

**Chart 10**
**The Effect of Acceptance, Ease of Use and Costly Access to Cash Combined (model estimates)[a]**




a. Shaded area represents 95 per cent confidence interval. Base case represents average value of regressors.

# Appendix – Variable List

*Socioeconomic factors*

- Household income: a series of dummy variables indicating annual household income group before tax.
- Age: a series of dummy variables indicating age group based on year of birth.
- Interaction of income group with credit card ownership dummy: a dummy that equals 1 if the individual belongs to the income group and indicated they had at least 1 credit card in their wallet at the beginning of the diary.
- Interaction of age group with credit card ownership dummy: a dummy that equals 1 if the individual belongs to the age group and indicated they had at least 1 credit card in their wallet at the beginning of the diary.
- Credit card ownership dummy: a dummy variable that equals 1 if the individual indicated they had at least one credit card in their wallet at the beginning of the diary.
- Debit card ownership dummy: a dummy variable that equals 1 if the individual indicated they had at least one debit card in their wallet at the beginning of the diary.
- Education: a series of dummy variables indicating the highest level of education the respondent completed.
- Family size: the number of individuals living in the household (including the respondent).
- Gender (male): a dummy variable that equals 1 if the respondent is male.
- Rural: a dummy variable that equals 1 if the respondent lives in a rural area.
- Marital status (not married): a dummy variable that equals 1 if the respondent indicated that they are single or separated.
- Renter: a dummy variable that equals 1 if the individual indicated they rented their home.
- Interaction of renter and not married: a dummy variable that equals 1 of the individual is both a renter and not married.
- Works full time: a dummy variable that equals 1 if the individual works full time.
- Home Internet access: a dummy that equals 1 if the individual has access to the Internet or online services at home.
- Financial manager: a dummy variable equal to 1 if the person indicated they are responsible for managing most of the household finances.
- Personal financial knowledge: the survey questionnaire asked individuals about their level of knowledge regarding a number of financial products and services, ranging from 1 "never heard of it" to 5 "very knowledgeable." With this information we created an index of an individual's level of financial knowledge.

*Card plans and cash holdings*

- Debit card free transactions: a dummy variable that equals 1 if an individual indicated they have 20 or more free transactions a month with their bank account package.
- Debit card monthly fee: a dummy variable that equals 1 if the individual pays a monthly fee on their bank account.
- Contactless: a dummy variable that equals 1 if the individual indicated that their credit card has a contactless feature.

- Credit card rewards and transaction value: a variable that takes the transaction value and multiplies it by a dummy variable that equals 1 if the individual has a credit card with rewards and 0 otherwise. We also include this variable squared.
- Revolver: a dummy variable that equals 1 if the individual had an unpaid balance on their last credit card statement.
- Beginning cash balances: the amount of cash an individual has on hand at the beginning of the diary to make transactions. Also included is the amount squared.
- Transaction value divided by cash holdings: the transaction amount divided by the beginning of the diary cash balances. We also include the squared value of this term.

*Transaction characteristics*

- Transaction amount: the total amount of the transaction in dollars. We also include this amount squared
- Transaction channel: dummy variables indicating the location where the transaction took place; for example, by phone or online. The base category is "at a store."
- Main type of good or service: a series of dummy variables indicating the main type of good or service purchased; for example, durable goods or gasoline. The base category is "groceries/drugs."
- Perceived acceptance: in the survey, we asked respondents what payment methods they thought were not accepted for each transaction. We then used this information to construct a dummy variable that equals 1 if a respondent thought all payment methods were accepted in the transaction.
- Reason for choosing main payment method: a series of binary variables taking on the value of 1 if a person indicated them as a reason for choosing their payment method. The reasons we include are ease of use, avoiding fees, delaying payment and avoiding fraud/theft/counterfeiting.
- "Weekend": a dummy variable that equals 1 if the transaction took place on a weekend.

*Perceptions and attitudes toward payment instrument attributes*

- Relative ease of use of cash: respondents were asked to rate on a 5-point scale (from "not at all easy to use" to "very easy to use") the ease of use of cash and other payment instruments. The score for cash was then divided by the score for the three major payment instruments to come up with a relative measure.
- Relative cost of cash: respondents were asked to rate on a 5-point scale (from "not at all costly" to "very costly") the cost of cash and other payment instruments. The score for cash was then divided by the score for the three major payment instruments to come up with a relative measure.
- Relative record keeping of cash: respondents were asked to rate on a 5-point scale (from "not at all useful" to "very useful") the usefulness of cash and other payment instruments for helping to keep a record of transactions. The score for cash was then divided by the score for the three major payment instruments to come up with a relative measure.
- Relative ranking of payment attributes: the survey asked respondents to rate attributes in terms of their importance when considering what payment instrument to use on a 10-point scale. We then weighted the score of the following attributes by the score of ease of use: cost, record keeping, acceptance, controlling spending, anonymity and security.